CLAIMS

1. An apparatus for depositing a planarizing layer over a wafer, comprising:

a tank defined by a bottom and an enclosing wall, the tank being configured to contain an electroless plating solution;

a wafer support structure disposed within the tank, the wafer support structure being configured to support a wafer at a submerged position within the electroless plating solution to be contained within the tank;

a planar member disposed above and substantially parallel to the wafer support structure, the planar member being movable in a direction toward the wafer support structure and in a direction away from the wafer support structure, the planar member capable of being positioned proximate to the wafer to be supported by the wafer support structure; and

a radiant energy source disposed above the planar member and above the wafer support structure, the radiant energy source being oriented to direct radiant energy through the planar member and to the wafer to be supported by the wafer support structure.

2. An apparatus for depositing a planarizing layer over a wafer as recited in claim 1, the planar member being composed of a material capable of transmitting radiant energy emitted from the radiant energy source toward the wafer support structure.

3. An apparatus for depositing a planarizing layer over a wafer as recited in claim 2, wherein the planar member is formed from one of quartz, sapphire, and polymer.

4. An apparatus for depositing a planarizing layer over a wafer as recited in claim 1, wherein the radiant energy source is configured to generate radiant energy having a wavelength range that is capable of selectively heating a material present at a surface of the wafer upon which the radiant energy will be incident.

5. An apparatus for depositing a planarizing layer over a wafer as recited in claim 1, wherein the radiant energy source is configured to apply a substantially uniform amount of the radiant energy over a surface of the wafer upon which the radiant energy will be incident.

6. An apparatus for depositing a planarizing layer over a wafer as recited in claim 1, wherein the planar member is broadly flexible and locally rigid.

7. An apparatus for depositing a planarizing layer over a wafer as recited in claim 1, further comprising:

a backing member disposed against a backside of the planar member, the backside of the planar member facing away from the wafer support structure, the backing member being configured to control a planarity of the planar member.

8. An apparatus for depositing a planarizing layer over a wafer as recited in claim 1, further comprising:

an inlet for supplying the electroless plating solution to the tank; and

an outlet for removing the electroless plating solution from the tank.

9. An apparatus for depositing a planarizing layer over a wafer as recited in claim 1, further comprising:

a heat exchanger capable of maintaining a temperature of the electroless plating solution to be contained within the tank.

10. A method for applying a planarizing layer on a surface of a wafer, comprising:

applying an electroless plating solution to a wafer surface, the electroless plating solution being maintained at a temperature at which a plating reaction does not readily occur;

positioning a planar member over and proximate to a top portion of the wafer surface, the planar member serving to expel a portion of electroless plating solution interposed between the planar member and the wafer surface; and

exposing the wafer surface to radiant energy, the radiant energy passing through the planar member, the radiant energy being capable of increasing a temperature of the wafer surface to a state at which the plating reaction occurs at an interface between the electroless plating solution and the wafer surface, the plating reaction forming a planarizing layer between the wafer surface and the planar member.

11. A method for applying a planarizing layer on a surface of a wafer as recited in claim 10, wherein positioning the planar member serves to entrap a portion of the electroless plating solution within recessed areas of the wafer surface.

12. A method for applying a planarizing layer on a surface of a wafer as recited in claim 10, further comprising:

controlling a wavelength range of the radiant energy to cause the radiant energy to selectively heat a material present at the wafer surface.

13. A method for applying a planarizing layer on a surface of a wafer as recited in claim 12, further comprising:

monitoring conditions at the wafer surface to ensure that the wavelength range of the radiant energy is established to selectively heat the material present at the wafer surface.

14. A method for applying a planarizing layer on a surface of a wafer as recited in claim 10, wherein the electroless plating solution is applied to the wafer surface by submerging the wafer in a bath of the electroless plating solution.

15. A method for applying a planarizing layer on a surface of a wafer as recited in claim 10, wherein exposing the wafer surface to radiant energy continues until reactants contained within the electroless plating solution adjacent to the wafer surface are consumed.

16. A method for applying a planarizing layer on a surface of a wafer as recited in claim 10, further comprising:

ceasing exposing the wafer surface to radiant energy;

removing the planar member from the position proximate to the top portion of the wafer surface, wherein removing the planar member allows fresh electroless plating solution to flow over the wafer surface, the fresh electroless plating solution serving to quench the wafer surface and replenish reactants present in a vicinity of the wafer surface; and

repeating the operations of positioning the planar member over and proximate to the top portion of the wafer surface and exposing the wafer surface to radiant energy.

17. A method for applying a planarizing layer on a surface of a wafer as recited in claim 10, wherein the wafer surface is exposed to the radiant energy in a substantially uniform manner.

18. A method for applying a planarizing layer on a surface of a wafer, comprising:

(a) applying an electroless plating solution to a wafer surface, the electroless plating solution being maintained at a temperature at which a plating reaction does not readily occur;

(b) moving a planar member over and proximate to a top portion of the wafer surface, the planar member serving to expel a portion of electroless plating solution interposed between the planar member and the wafer surface;

(c) applying radiant energy through the planar member and to the wafer surface, the radiant energy being capable of increasing a temperature of the wafer surface to a state at which the plating reaction occurs at an interface between the electroless plating solution and the wafer surface;

(d) controlling a wavelength range of the radiant energy to cause the radiant energy to selectively heat a material present at the wafer surface;

(e) allowing reactants present in a remaining amount of electroless plating solution interposed between the planar member and the wafer surface to be consumed in plating reactions;

(f) discontinuing application of radiant energy to the wafer surface;

(g) moving the planar member away from the top portion of the wafer surface to allow fresh electroless plating solution to be introduced between the planar member and the wafer surface; and

(h) repeating elements (b) through (g) to approach planarity of the wafer surface.

19. A method for applying a planarizing layer on a surface of a wafer as recited in claim 18, wherein applying the electroless plating solution to the wafer surface is performed by submerging the wafer in a bath of the electroless plating solution.

20. A method for applying a planarizing layer on a surface of a wafer as recited in claim 18, wherein moving the planar member over and proximate to the top portion of the wafer surface serves to entrap a portion of the electroless plating solution within recessed areas of the wafer surface.